

IN THE CLAIMS:

1. (Currently amended) A fade-resistant forward error correction (FEC) method for a free-space optical communications system, comprising:

encoding user input data with a ~~FEC~~ forward error correction (FEC) code to produce encoded user data;

producing a plurality of encoded user data channels from said encoded user data, wherein each particular channel of said ~~delayed~~ encoded user data channels comprises a unique delay relative to all of the other channels of said plurality of encoded user data channels;

a step for transmitting said plurality of encoded user data channels across a free space optical channel to produce transmitted channels;

a step for receiving said ~~plurality of encoded user data~~ transmitted channels and separating each channel from said ~~plurality of encoded user data~~ transmitted channels to produce a plurality of received channels;

detecting each channel of said plurality of received ~~beams~~ channels;

adjusting selected ones of said received ~~beams~~ channels so all of them are temporally equal;

decoding said received ~~beams~~ channels to produce decoded channels;

and

sending the first successfully decoded received ~~beam~~ channel of said decoded channels as a recovered user data output, wherein said step for

transmitting said plurality of encoded user data channels across a free space

optical channel comprises:

_____ in a first quadrature phase shift keying (QPSK) encoder, QPSK

encoding a first group of at least two channels of said encoded user data

channels and combining said first group in said first QPSK encoder into a first

QPSK transmission channel;

_____ driving a first optical phase modulator (OPM) with said first QPSK

transmission channel;

_____ modulating a first laser beam produced by a first UDWDM laser with

said first OPM to produce a first OPM channel;

_____ in a second quadrature phase shift keying (QPSK) encoder, QPSK

encoding a second group of at least two channels of said encoded user data

channels and combining said second group in said second QPSK encoder into a

second QPSK transmission channel;

_____ driving a second optical phase modulator (OPM) with said second

QPSK transmission channel;

_____ modulating a second laser beam produced by a second UDWDM laser

with said second OPM to produce a second OPM channel;

_____ combining said first OPM channel and said second OPM channel in a

wavelength division multiplexing multiplexor (WDM-MUX) to produce

combined channels; and

transmitting said combined channels across said free-space optical channel to produce said transmitted channels;

wherein said step for receiving said plurality of encoded user data channels and separating each channel from said plurality of encoded user data channels comprises:

demultiplexing said plurality of encoded user data channels of said combined channels in a wavelength division multiplexing de-multiplexor to reconstruct said first OPM channel and said second OPM channel to produce a reconstructed first OPM channel and a reconstructed second OPM channel;

in a first QPSK optical phase decoder, decoding said first reconstructed OPM channel to produce a first group of light beams corresponding to said first group; and

in a second QPSK optical phase decoder, decoding said second reconstructed OPM channel to produce a second group of light beams corresponding to said second group, wherein said first group of light beams and said second group of light beams are referred to as a plurality of received beams.

2. (Original) The method of claim 1, wherein the step for transmitting said plurality of encoded user data channels across a free space optical channel comprises modulating said plurality of encoded user data channels with a modulation scheme selected from the group consisting of amplitude modulation, frequency modulation and phase modulation.

3-5. (Canceled)

6. (Currently amended) The method of claim 1, wherein said FEC code includes a forward error correcting codes that select code that selects viable received channels from a set of diversity delayed channels.

7. (Original) The method of claim 1, wherein said step for transmitting said plurality of encoded user data channels across a free space optical channel includes modulating said plurality of encoded user data channels with high-order modulation.

8. (Original) The method of claim 1, wherein said step for transmitting said plurality of encoded user data channels across a free space optical channel includes arbitrary combinations of ultradense wavelength division multiplexing and high-order modulation of said plurality of encoded user data channels.

9. (Original) The method of claim 1, wherein the number of diverse channels and the length of the delays are dynamically reconfigurable.

10. (Original) The method of claim 1, wherein said method is protocol independent.

11. (Currently amended) A fade-resistant forward error correction (FEC) system for free-space optical communication, comprising:

~~means~~ an FEC code encoder for encoding user input data with a FEC code to produce encoded user data;

means for producing a plurality of encoded user data channels from said encoded user data, wherein each particular channel of said ~~delayed~~ encoded user data channels comprises a unique delay relative to all of the other channels of said plurality of encoded user data channels;

means for transmitting said plurality of encoded user data channels across a free space optical channel to produce transmitted channels;

means for receiving said ~~plurality of encoded user data~~ transmitted channels and separating each channel from said ~~plurality of encoded user data~~ transmitted channels to produce a plurality of received channels;

means for detecting each said plurality of ~~beams~~ channels;

means for adjusting selected ones of said received ~~beams~~ channels so all of them are temporally equal;

means for decoding said received ~~beams~~ channels to produce decoded channels; and

means for sending the first successfully decoded received ~~beam~~ channel of said decoded channels as a recovered user data output, wherein said

means for transmitting said plurality of encoded user data channels across a free space optical channel comprises:

_____ a first quadrature phase shift keying (QPSK) encoder for QPSK encoding a first group of at least two channels of said encoded user data channels and combining said first group in said first QPSK encoder into a first QPSK transmission channel;

_____ a first driver for driving a first optical phase modulator (OPM) with said first QPSK transmission channel;

_____ a first modulator for modulating a first laser beam produced by a first UDWDM laser with said first OPM to produce a first OPM channel;

_____ a second quadrature phase shift keying (QPSK) encoder for QPSK encoding a second group of at least two channels of said encoded user data channels and combining said second group in said second QPSK encoder into a second QPSK transmission channel;

_____ a second driver for driving a second optical phase modulator (OPM) with said second QPSK transmission channel;

_____ a second modulator for modulating a second laser beam produced by a second UDWDM laser with said second OPM to produce a second OPM channel;

_____ a wavelength division multiplexing multiplexor (WDM-MUX) for combining said first OPM channel and said second OPM channel to produce combined channels; and

means for transmitting said combined channels across said free-space optical channel to produce said transmitted channels;

wherein said means for receiving said plurality of encoded user data channels and separating each channel from said plurality of encoded user data channels comprises:

a wavelength division multiplexing de-multiplexor to reconstruct said first OPM channel and said second OPM channel to produce a reconstructed first OPM channel and a reconstructed second OPM channel;

a first QPSK optical phase decoder for decoding said first OPM channel to produce a first group of light beams corresponding to said first group;
and

a second QPSK optical phase decoder for decoding said second OPM channel to produce a second group of light beams corresponding to said second group, wherein said first group of light beams and said second group of light beams are referred to as a plurality of received beams.